

POLICY REPORT

The Future of Yellowstone Bison Management





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Bison in the
Lamar Valley.
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ON THE COVER:
Bull bison in the
Yellowstone River.
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Executive Summary

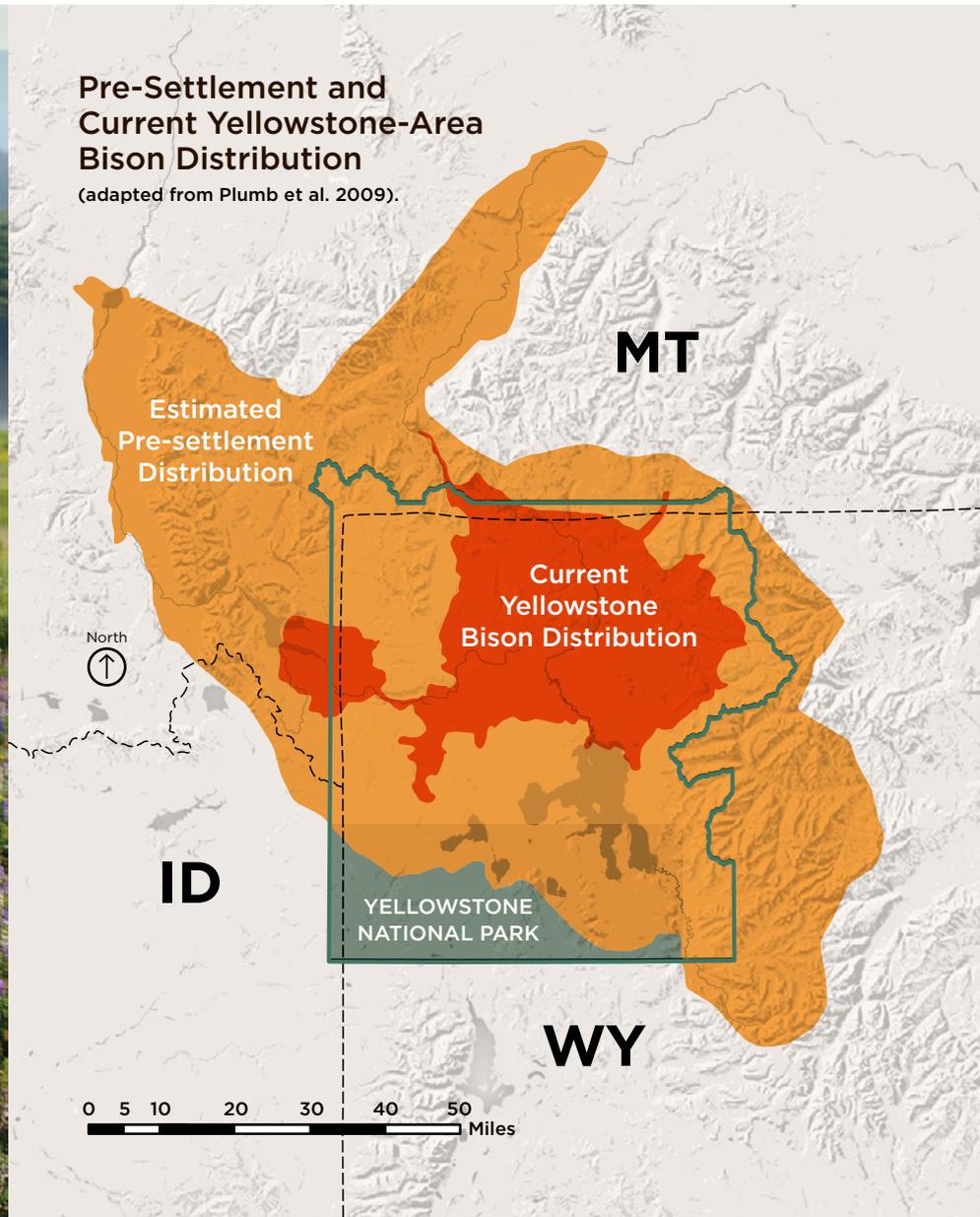
The bison of Yellowstone National Park (YNP) in the Greater Yellowstone Ecosystem comprise the nation's only continuously wild population of the species—a symbolically and genetically important remnant of the vast herds that once played a dominant ecological role across the American landscape. The survival of Yellowstone bison has been an ongoing struggle, as the species barely escaped extinction only to endure a changing series of management approaches by the National Park Service within YNP and by state and federal agencies on adjacent lands in Montana in the ensuing decades. Much of the stringent management approach to-date for bison has been driven by fear of the animals transmitting brucellosis, a nonnative livestock disease, to cattle found in areas adjacent to the park.

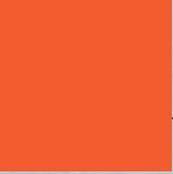
Bison in Yellowstone National Park.
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Within YNP, bison thrive as a population largely managed by natural factors such as weather and predators. The park provides abundant seasonal habitat, but in the winter when snow within the park grows impenetrable, bison often migrate beyond park boundaries to find suitable forage. Along the edge of the park and on public and private lands in Montana, bison face intensive management including hazing, a practice where bison are driven away from areas where they are not currently allowed, and shipment to slaughter. Such management is guided by state and federal agencies and Native American tribes under the direction of the 2000 Interagency Bison Management Plan (IBMP). This approach to bison management costs taxpayers millions and has created consistent controversy.

Fortunately, the opportunity exists today to create a new era in management for Yellowstone bison. The Park Service and the State of Montana along with cooperating agencies from Native American tribes and other federal agencies are in the process of developing a new Yellowstone-area bison conservation plan to replace the outdated 2000 IBMP. The development of a new plan offers the opportunity to set Yellowstone bison management on a better path that will ensure the long-term survival of the herd, while limiting the risk of disease transmission to domestic livestock.





Summary of Catalysts for Change in Bison Management



Bison in the snow.
© Neal Herbert



SPOTLIGHT

Brucellosis

The World Health Organization defines brucellosis as a zoonotic disease found in cattle that is transmitted through blood, placenta, fetuses, uterine secretions, or through consumption of raw animal products. In humans it is known as undulant fever.

Since the original IBMP was signed in 2000, managers have been incrementally moving toward managing Yellowstone bison like other migratory wildlife, but controversy and issues persist. The IBMP was designed to enable management adaptations based on advancements in science, gained management experience, and changes in the legal framework, social setting, and the landscape. Such amendments to the plan have led to increased tolerance for bison on habitat adjacent to YNP during winter months. Some of the key areas where change has occurred include our understanding of the risk of brucellosis transmission, our understanding of viable alternatives to the yearly bison slaughter, and our understanding of how we are managing the disease in other species.

Brucellosis

The risk of brucellosis transmission from bison to cattle drives the management requirements under the current IBMP. The seroprevalence rate of Yellowstone bison is approximately 50%, which indicates exposure to the disease but does not necessarily mean an active infection or the ability to transmit the disease. However, the assumed risk is not as great as once thought in terms of the length of time that the disease remains viable in the environment. This understanding can enable the use of targeted situational separation of the two species rather than broad separation. Additionally, advances in science have indicated that opportunities exist to use quarantine programs to reduce the need to ship animals to slaughter. These quarantine programs could be utilized to relocate some Yellowstone bison to new appropriate locations to establish new conservation herds where interest exists.

The economic implications of brucellosis infection in cattle have also dramatically changed in recent years. This is largely due to the adoption of the Designated Surveillance Area (DSA), which is a defined geographic area where there is increased brucellosis testing and vaccination requirements for cattle. Such risk-reduction should substantially alter how we

evaluate alternative management approaches for bison. We should consider options that are not as risk averse in the interest of reducing costs of current management efforts and improving our ability to better manage bison as wildlife.

Ongoing Bison Slaughter

Shipping bison to slaughter triggers sharp criticism from the public. The traditional approach for managing the distribution and population of wild game species in North America has been through public hunting. By providing more bison habitat outside of YNP, this model could be used to more effectively manage the size and distribution of the population.

The retirement of key grazing allotments over the last 15 years has substantially reduced the risk of brucellosis transmission from bison to cattle on lands adjacent to YNP. The new Yellowstone-area bison conservation plan should recognize the value of voluntary grazing retirements to increase public hunting opportunities and reduce the risk of brucellosis transmission from bison to cattle.

Brucellosis Beyond Bison

It is important to recognize that brucellosis threats go beyond bison in the Greater Yellowstone Ecosystem. For many years, rates

of brucellosis seroprevalence in Montana's elk population were quite low, and found only in areas close to YNP. Over time, seroprevalence rates have increased in some Montana elk herds and spread to a larger area, which has led to an expansion of the DSA. Recent seroprevalence rates were reported at just over 50% in elk found in the Paradise Valley north of YNP. That rate is similar to the rate historically occurring in the Yellowstone bison herd. While bison have been aggressively managed, Montana elk have been more appropriately managed through tactics such as situational spatial and temporal separation of elk and cattle.

The many state, federal, and tribal interests that have been driving decision making through the IBMP specific to Yellowstone bison management should be applauded for the advances they have made to-date. We have come a long way from the bison management policies of the 1980's. However, it is time to adjust our approach once again and fully replace the outdated IBMP. Simply put, we know much more today than we did when the original IBMP was developed, so the opportunity exists to take what we have learned and make a significant change in how we work to ensure the long-term conservation of these iconic bison.

Summary of Recommendations for a New Yellowstone–Area Bison Conservation Plan

The development of the new bison conservation plan creates an opportunity to set bison management on a better informed path that will ensure the long-term survival of the Yellowstone herd, while limiting the risk of disease transmission to domestic livestock in Montana. The important elements of this new approach are outlined here and provided in detail in the full report.

Development of the New Yellowstone–Area Bison Conservation Plan

- The management agencies should evaluate different models for stakeholder involvement to better incorporate stakeholder interests into the new plan and plan development. The selected model should require, among other things, input in plan development from a stakeholders group representing a broad set of interests. For example the group should include: sportsmen, livestock producers, wildlife advocates, and local businesses.
- The agencies should create an independent science panel to provide review and recommendations on the science applied in development of the new plan.
- The analysis of new alternatives should include an explicit assessment of risk that describes the probability and magnitude of environmental and economic impacts.

General Goals and Provisions for the New Yellowstone–Area Bison Conservation Plan:

- Management of a wild bison population in YNP and on adjacent lands in Montana.
- Manage Yellowstone area bison to limit the risk of the spread of brucellosis from wild bison to cattle.
- Manage for bison outside of YNP under the principles of the North American Model for wildlife management.
- Provide for adequate conservation measures to prevent the listing of bison under the Endangered Species Act.

- A wild population of bison should be defined as: One that roams within a conservation area that is large enough to sustain ecological processes such as migration and dispersal, sufficiently abundant to mitigate the loss of existing genetic variation, subject to forces of natural selection such as competition for breeding opportunities and food, predation, and substantial environmental variability, and not owned but managed for the public good (adapted from White and Wallen 2012).
- The new plan should focus on managing the risk of brucellosis infection rather than targeting brucellosis eradication. Eradication of brucellosis in wildlife is not a realistic goal given currently available disease management tools.
- The new plan should remain an adaptive management plan that is adjusted over time given changes in relevant science, land management, the ecological environment, and the socio-political landscape.
- The management unit definition must reflect the goals of the new plan as outlined here, and more specifically ensure that bison are welcome on year-round habitat in Montana.

Management Tools

- Risk of brucellosis infection should be primarily addressed through situational use of spatial and temporal separation of bison and domestic cattle. During high-risk periods the plan should prevent co-mingling of bison and cattle.
- The abundance and distribution of bison should be managed as much as possible through state licensed hunting and tribal treaty rights hunting outside of YNP. Bison hunting should end by March 31st each year.
- Pursue an ongoing and successful quarantine program that would create the opportunity for YNP bison to be transferred to tribal lands, federal lands, and other potential habitat that meets predefined standards.
- In extreme circumstances when bison numbers have far exceeded acceptable population ranges it may be appropriate to use the Stephens Creek capture facility. However, all other management tools and approaches should be attempted before use is considered.
- Livestock vaccination should continue as prescribed under the current rules for the DSA. Vaccinating bison is not a cost effective tool for managing risk of brucellosis infection and should not be pursued.
- Develop a publicly funded compensation program for land-

owners that incur bison caused damage to personal property, or economic loss due to brucellosis infection in cattle.

Bison Population

- The bison population addressed by the new plan should be managed to preserve the ecological integrity of the population (as outlined in our definition of a wild bison population) and maintain or improve genetic diversity, while not increasing the risk of brucellosis transmission.
- Develop population objectives for different habitat locations that reflect the unique human needs and ecological characteristics associated with the current or potential bison habitat in that location.
- Use the Northern Wildlife Range Working Group (i.e. the multi-agency collaborative that currently exists) to annually review bison harvest levels, habitat management needs, and inventory needs.

Research and Education

- Research and Monitoring: The new plan should include an assessment of research and monitoring priorities and identify key management questions that must be addressed to advance the adaptive framework articulated by the plan.
- Education and Public Outreach: The new plan should include a communications strategy that articulates clear targets, strategies, and channels for communicating with the public about bison management.

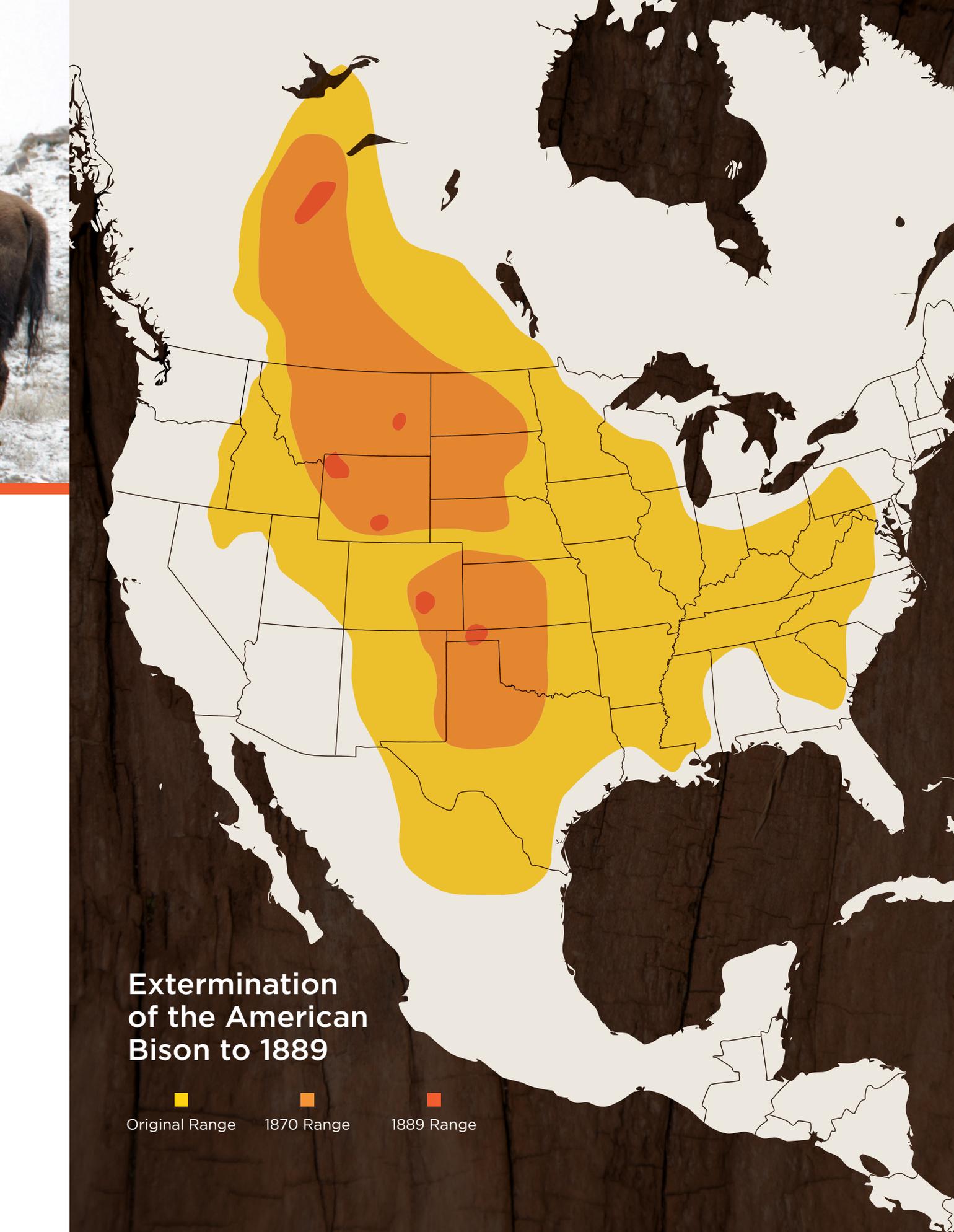


Bison History in the Greater Yellowstone Ecosystem

Once estimated at 30 million in North America (Meagher 1983), bison roamed most of the continent, but the highest concentration of bison occurred on the rich Great Plains. Commercial slaughter of the massive herds is well known and documented (Hornaday 1889). By 1889, total bison numbers had been reduced to an estimated 1,091 in North America. Most of those were under private ownership in captive herds and in zoos. Only YNP and Wood Buffalo National Park in Canada contained wild herds of bison by the turn of the 20th century, and 23 were all that remained in Yellowstone. Finding refuge in the park's high mountain valleys, the few surviving bison were protected from poachers by the U.S. Army. Those bison, in addition to a small number later introduced from other herds, are the progenitors for the nearly 5,000 bison found in Yellowstone today.

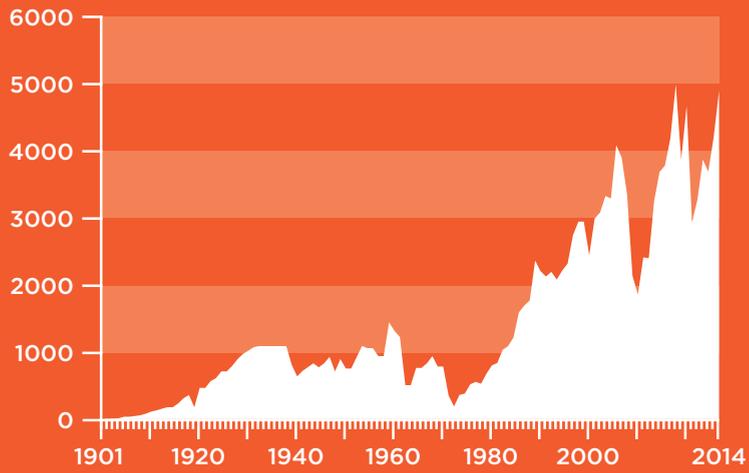
From the early 1900s until the 1930s, YNP took a more hands-on approach to bison management in order to conserve the few remaining bison and increase the size of the herd. The park supplemented the herd with three bulls from the Goodnight herd in Texas and 18 cows from the Pablo-Allard herd in western Montana (Gates 2005). The Park Service managed the imported bison separately from the wild herd until the 1920s. This was the period when brucellosis first appeared in YNP bison.

The World Health Organization defines brucellosis as a zoonotic disease found in cattle that is transmitted through blood, placenta, fetuses, uterine secretions, or through consumption of raw animal products. In humans it is known as undulant fever. The infection in Yellowstone bison most likely came from exposure to domestic cattle infected with brucellosis, or from feeding infected cow's milk to bison calves (USDI, NPS et. al. 2000a).



Extermination of the American Bison to 1889

Original Range 1870 Range 1889 Range



Yellowstone Bison Population from 1901-2014

Figure 1. (USDI, NPS et. al. 2000a,
White et.al. 2015)



Bison in the Lamar Valley.
© Neal Herbert

The arrival of brucellosis in YNP bison proved seminal, setting the stage for modern bison management in the Greater Yellowstone Ecosystem (GYE)—management that revolves around the perceived risk of brucellosis transmission from bison back to cattle that range adjacent to the park.

Bison numbers in YNP grew to over 1,000 in the 1930s, when the Park Service began capping the population at 1,000 (USDI, NPS et. al. 2000). From the early 1930s through 1966, YNP maintained bison numbers below 1,000 by shipping surplus animals to slaughter or to private estates, zoos, and public parks. In 1967, YNP adopted a new reliance on natural regulation, an approach to management that ended the practice of reducing bison numbers through removal from the park. The Park Service's new approach was to manage

YNP as an ecological entity, providing for restoration, protection, and maintenance of native complexes (Gates 2005). With this change came a periodically fluctuating but generally steady increase in the numbers of bison in the park (Figure 1) (USDI, NPS et. al. 2000a, White et.al. 2015).

In 1968, the Park Service began controlling bison movement across the park boundary to address concerns from the livestock industry that bison could spread brucellosis to cattle in Montana. Bison movement was limited by redirecting bison back into the park using rangers on foot and horseback (i.e. commonly referred to as hazing).

As bison numbers grew, the State of Montana and federal agencies recognized the need for some type of comprehensive management plan for bison. In 1990, a Notice of Intent was filed in the Federal Register by the Park Service and U.S. Forest Service to prepare a bison management plan along with Montana Fish, Wildlife and Parks (MFWP). This was followed by a memorandum of understanding (MOU) in 1992 that defined roles and responsibilities for preparing the bison management plan. That MOU was signed by the Park Service, Forest Service, State of Montana, and the Animal and Plant Health Inspection Service (APHIS) (USDI, NPS et. al. 2000a).

Despite best intentions, developing a shared bison management plan for multiple agencies in the GYE proved difficult to achieve, particularly given their different missions, constituencies, and legal authorities. These complexities led to, among other things, four interim management plans issued between the Notice of Intent in 1990 and the signing of the final plan in 2000. Two of the interim plans were prepared by the Park Service, one by the State of Montana, and one was jointly prepared by the Park Service and the state.

All interim plans essentially called for removing bison at the park boundary to protect private property, provide for human safety, and to prevent the spread of brucellosis from bison to domestic livestock. In the mid-80s, the Montana Legislature authorized licensed hunters to take bison adjacent

to the park. The hunters were guided by state employees, and the hunt had all the appearances of an administrative removal of bison rather than a fair chase hunt. The hunt generated intense national media coverage and controversy, eventually prompting the Montana Legislature to stop bison hunting in 1990. After 1990, it fell to state and federal employees to shoot bison outside the park as needed for control of population numbers and movement outside Yellowstone's borders. In addition, the last interim plan in 1997 called for trapping bison as they left or attempted to leave the park, as well as slaughter of captured bison that tested positive for brucellosis. This provision became a key feature of the final adopted plan.

The struggle to prepare a bison management plan that all partners could agree on led to a lawsuit by the State of Montana in 1995. Montana claimed the conflicting actions of the Park Service and federal authorities governing brucellosis control—APHIS—were delaying preparation of a long-term management plan for bison. The state argued that the delay could lead to a downgrade in Montana's brucellosis-free status, creating negative economic impacts. The lawsuit led to a settlement that resulted in an agreement on the last interim management plan, and a re-commitment to cooperate to complete the final bison-management plan and associated environmental impact statement (EIS). The Interagency Bison Management Plan (IBMP) and EIS were completed in 2000.

The Interagency Bison Management Plan (2000)

The IBMP record of decision was signed in December 2000 by Montana’s Governor and U.S. Secretaries of the Interior and Agriculture. Their signatures reflected agreement among all the federal and state partners involved with development and implementation of the IBMP: APHIS, (i.e. agency with U.S. regulatory authority for livestock disease); Forest Service (U.S. agency responsible for management of bison habitat on federal land outside of YNP); National Park Service (i.e. U.S. agency responsible for bison and habitat management within the boundaries of YNP); MFWP (i.e. state agency responsible for wildlife management); and the Montana Department of Livestock (i.e. (MDOL) state agency with state regulatory authority for livestock and bison diseases).

The goals of the plan are to “maintain a wild, free-ranging population of bison and address the risk of brucellosis transmission to protect the economic interest and viability of the livestock industry in Montana.” The plan clearly states that the eradication of brucellosis is not the target. Rather, the plan focuses on preventing transmission of brucellosis between bison and livestock (USDI, NPS et. al. 2000b).

The fundamental management approach prescribed in the IBMP is to maintain temporal and spatial separation between bison and domestic livestock. This ensures that bison and cattle do not concurrently occupy the same area, although they may occupy the same area when the other is not present. This is achieved in the plan by establishing three bison-management zones, each with unique management requirements. Zone 1 is within the boundaries of YNP. Zone 2 is an area outside the YNP boundaries where there is some level of tolerance for bison during part of the year. Zone 3 is an area where there is zero tolerance for bison.

The IBMP is adaptive so that “future management actions could be adjusted, based on feedback from implementation of the proposed risk management actions.” This adaptive management approach has been applied over the past 15 years, and is also explicitly reflected in the form of prescribed management steps. The IBMP identifies three management steps for the northern side of the park and three for the western side. All steps link more tolerance for bison outside of the park to the completion of efforts to limit the risk of brucellosis infection (Table 1).

Step 1 on the northern side calls for no bison on private or public lands north of the park boundary. Hazing will be used to maintain this boundary, along with capture of bison at the Stephens Creek capture facility in YNP when bison attempt to leave the park. Captured bison testing negative for brucellosis (i.e. seronegative) will be held in the trap and released in the spring, while those testing positive (i.e. seropositive) will be sent to slaughter.

Step 1 on the western side calls for no untested bison on private or public lands outside of the park boundary, with hazing used to maintain the integrity of the park boundary. Escaping bison will be trapped and tested for brucellosis. Seropositive-tested bison are to be sent to slaughter and as many as 100 seronegative-tested bison can be released (i.e. “seropositive” means that blood tests show the animal has been exposed to the disease and “seronegative” the opposite). This step also includes detailed limitations on seronegative bison that are pregnant. Any tested seronegative bison tolerated outside the park under the terms of the IBMP must be hazed back into YNP by May 15.

| | ↑ NORTH OF YNP | | ← WEST OF YNP | |
|--------|--|--|--|--|
| | TRIGGERS | MANAGEMENT ACTIONS | TRIGGERS | MANAGEMENT ACTIONS |
| STEP 1 | At initial plan implementation | <ol style="list-style-type: none"> 1. Haze bison to keep them in YNP. 2. When hazing ineffective, capture and ship seropositive bison to slaughter, and hold and release up to 125 seronegative bison back into YNP in spring. 3. Vaccinate eligible bison in trap. | At initial plan implementation | <ol style="list-style-type: none"> 1. Haze bison exiting YNP back into YNP. 2. When hazing ineffective, capture and test bison exiting YNP; send seropositive bison to slaughter; release up to 100 seronegative bison. 3. All bison will be hazed back into YNP by May 15. |
| STEP 2 | When cattle removed from Royal Teton Ranch | <ol style="list-style-type: none"> 1. Same as step 1 with some tolerance outside YNP in Zone 2. 2. Initially tolerate 25 seronegative bison outside YNP in Zone 2 and up to 100 depending on behavior. 3. All bison hazed back into YNP by April 15. | When a safe and effective brucellosis vaccine is available that can be remotely delivered to bison. | <ol style="list-style-type: none"> 1. Haze bison back into YNP. 2. All untested eligible bison outside YNP will be remotely vaccinated. 3. All bison back in YNP by May 15. |
| STEP 3 | <p>When:</p> <ol style="list-style-type: none"> 1. Complete research on brucellosis persistence and disappearance. 2. Initiate effective vaccination program in YNP using remote delivery. 3. Demonstrate ability to provide spatial separation of bison and cattle to control maximum number of bison in Zone 2. | <ol style="list-style-type: none"> 1. Same as step 2 except allow up to 100 untested bison in Zone 2 outside YNP. 2. Those untested bison must still be back in YNP by April 15. | <p>When:</p> <ol style="list-style-type: none"> 1. Complete research on brucellosis persistence and disappearance. 2. Initiate effective vaccination program in YNP using remote delivery. 3. Demonstrate ability to provide spatial separation of bison and cattle to control maximum number of bison in Zone 2. | <ol style="list-style-type: none"> 1. Remotely vaccinate bison in and outside YNP. 2. Allow up to 100 untested bison outside of YNP. |

Table 1. Summary of IBMP Management Triggers/Management Actions by Plan Step and Management Zone

The trigger or prompt on the northern side of the park to go from Step 1 to Step 2 occurs when cattle are removed from the Royal Teton Ranch, which is a private ranch north of Yellowstone. The triggers to go from Step 2 to Step 3 on the northern side are the completion of research related to persistence of brucellosis in the environment, the initiation of a vaccination program in YNP using an effective remote delivery system, and demonstrated ability to provide for spatial separation and to control the maximum number of bison in Zone 2 outside the park. Any bison that are tolerated outside of the park boundary

under the terms of the IBMP must be hazed back into the park by April 15.

On the western side of YNP, the transition from Step 1 to 2 begins when a safe and effective brucellosis vaccine can be remotely delivered. The requirements to transition from Step 2 to 3 on the western side are the same as on the northern side of YNP.

Although most of the area in and around YNP where bison may be found is labeled Zone 1, 2, or 3, a few areas have special management designation. Untested bison are allowed year-round in the Eagle

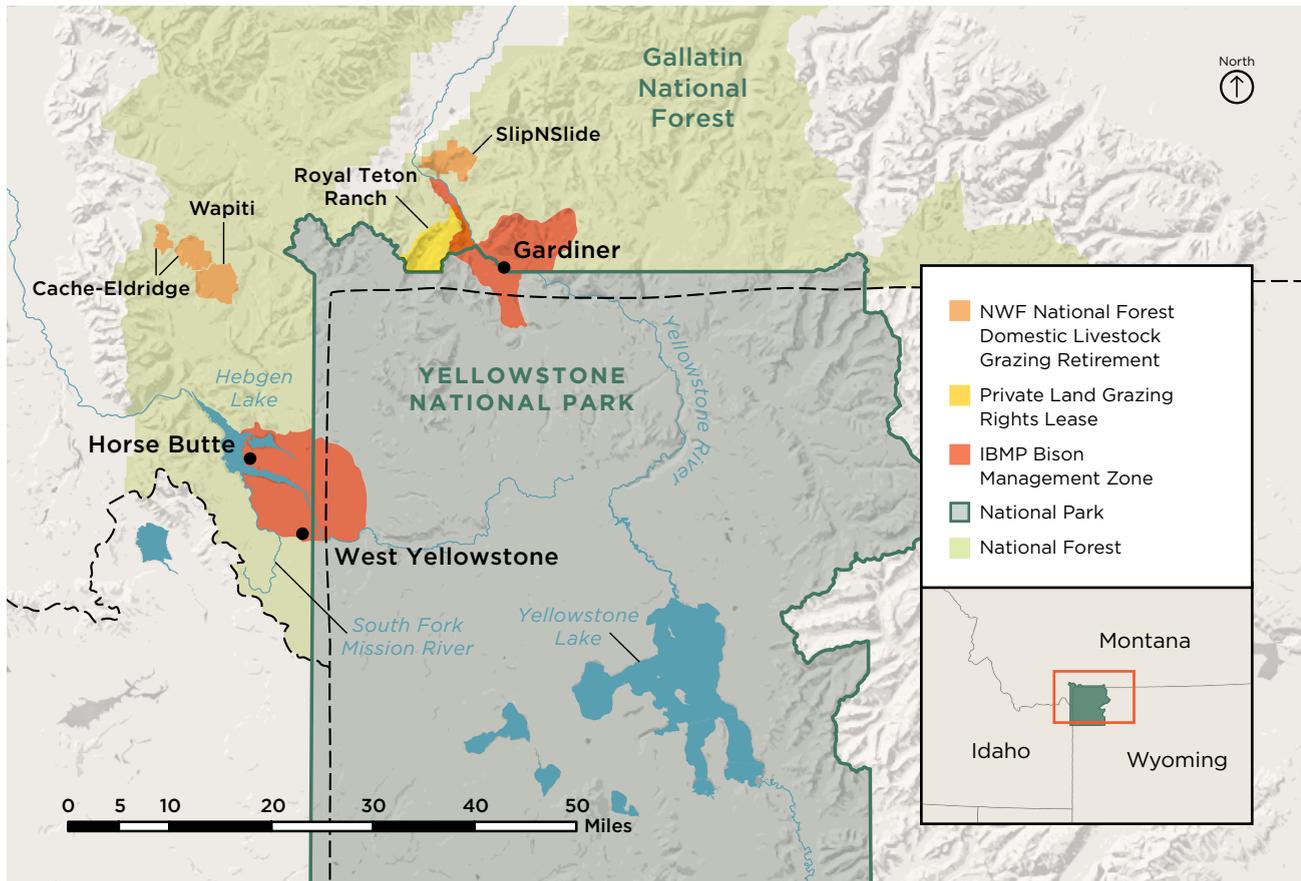
Creek/Bear Creek area northeast of Gardiner, the Absaroka Beartooth Wilderness north of YNP, the Cabin Creek Recreation and Wildlife Management Area, and in the Monument Mountain Unit of the Lee Metcalf Wilderness. There is also some tolerance for untested bison in the Taylor Fork above the Gallatin River, as long as they stay out of the cattle allotment in the Upper Taylor Fork that was leased for cattle grazing at the time the IBMP was adopted.

Other key provisions in the IBMP are important to note. The IBMP makes a commitment that removal of bison



Bison cow nursing her calf in the middle of the road in Lamar Valley.
© Neal Herbert

Reducing Wildlife Livestock Conflict



under the terms of the plan “...will not jeopardize the ecological integrity of the bison herd within the park”. The plan includes specific recognition that cattle vaccination and management of cattle on public lands are important tools for managing the risk of brucellosis transmission from bison to cattle. The IBMP directs the State of Montana to encourage voluntary vaccination of eligible cattle in the area that may be occupied by bison under the plan and called for mandatory vaccination by 2001 if 100% voluntary compliance is not achieved.

The IBMP identifies a population target of 3,000 bison. When the population exceeds that level, agencies may lean more on lethal control measures

under the plan—less so when the population is substantially under that target. The population target of 3,000 bison was adopted in order to limit the number of bison that would exit YNP during severe winter conditions (USDI, NPS 2000a). When populations get beyond 3,000 bison, the outmigration of bison is closely related to winter severity (NAS 1998).

The federal and state agencies responsible for implementing the IBMP have used the plan’s adaptive language to make changes in the application on the ground. Those adaptive changes are summarized next.

Highlights of IBMP Implementation

As we consider a new conservation plan for managing Yellowstone-area bison, it is also important to fully understand how bison have been managed under the IBMP from adoption in 2000 until 2015. To help chart a new course, we must examine what has and has not been successful over the past 15 years under the IBMP. Implementation was initially guided by interpretation of the language in the IBMP, but the plan has been managed as a living document that has evolved over time through adaptive management. These adaptive changes were triggered by changes in the knowledge base on bison management through on the ground experience, research findings, land management changes outside the YNP boundaries and changes in the legal framework. The details of implementation are summarized here.

-
- 2000** • Interagency Bison Management Plan Adopted
- 2002** • Operating Procedures Developed
- 2003** • Horse Butte Grazing Allotment Retired
- 2004** • Bison Quarantine Tested
Bison Hunting Reconsidered
- 2005** • Tribes Asserted Their Right to Hunt Based On Historical Treaties
Completed “A Status Review of Adaptive Management Elements 2000-2005”
- 2006** • Adaptive Changes Altered Operating Procedures
- 2008** • Government Accountability Office (GAO) Completes Audit of IBMP Performance
IBMP Managers Produce Adaptive Management Changes Captured in a Format Responsive to GAO Audit Findings
Royal Teton Ranch Grazing Rights Leased
Cache Eldridge Grazing Allotment Retired
- 2009** • Tribal Representatives Added to the IBMP Managers’ Committee
- 2010** • Official Order Creates Designated Surveillance Area for Brucellosis
Wapiti Grazing Allotment Retired
- 2011** • Slip and Slide Grazing Allotment Retired
Citizen’s Working Group Presents Recommendations to IBMP Managers
Adaptive Changes to Allow for Greater Tolerance of Bison
- 2012** • Adaptive Changes With Detail on Bison Use North of the Park Line
- 2013** • Adaptive Changes to Address Hazing Bison Away from Zone 3 Boundary
- 2014** • Adaptive Change to Consistently Document All Previous Adaptive Changes

2002

Operating Procedures Developed



Bison in winter. © George Peters/ISTOCKPHOTO

After the IBMP was formally signed and adopted in December 2000, the five agencies bound by the management commitments in the IBMP immediately began to implement the terms of the IBMP. They also began efforts to reach agreement on a set of operating procedures that would guide IBMP implementation. That agreement was not completed until December of 2002. It described the details of the on-the-ground management tasks called for in the IBMP and assigned lead and secondary responsibilities for completing those tasks to the various agencies. For example, they addressed who would have responsibility for hazing bison when the species migrates outside of YNP, who would have responsibility for trapping and transporting bison, etc. The 2002 Operating Procedures remained the guiding document for management actions until they were revised in 2007. Since then they have been reviewed and revised several times. The reviews and revisions have generally focused on necessary operational changes that respond to the previous year's experience in implementing the IBMP, or to reflect adaptive changes agreed to by the IBMP management agencies. Those adaptive changes were typically a response to new research findings, changes in the legal framework, and changes in the social setting, as well as experience in implementing the IBMP.

2003

Horse Butte Grazing Allotment Retired

One of the key areas for bison/livestock conflict on the west side of the Park was on the Horse Butte peninsula where the Gallatin National Forest (GNF) had issued a public land domestic livestock grazing lease. This conflict was eliminated when the National Wildlife Federation worked with the lessee and the GNF to find other grazing opportunities for the lessee outside of the Yellowstone area. This allowed the GNF to then permanently retire this grazing allotment. This action created more flexibility for the IBMP managers to manage bison on the western side of the park and better facilitate spatial and temporal separation of bison and livestock.

2004

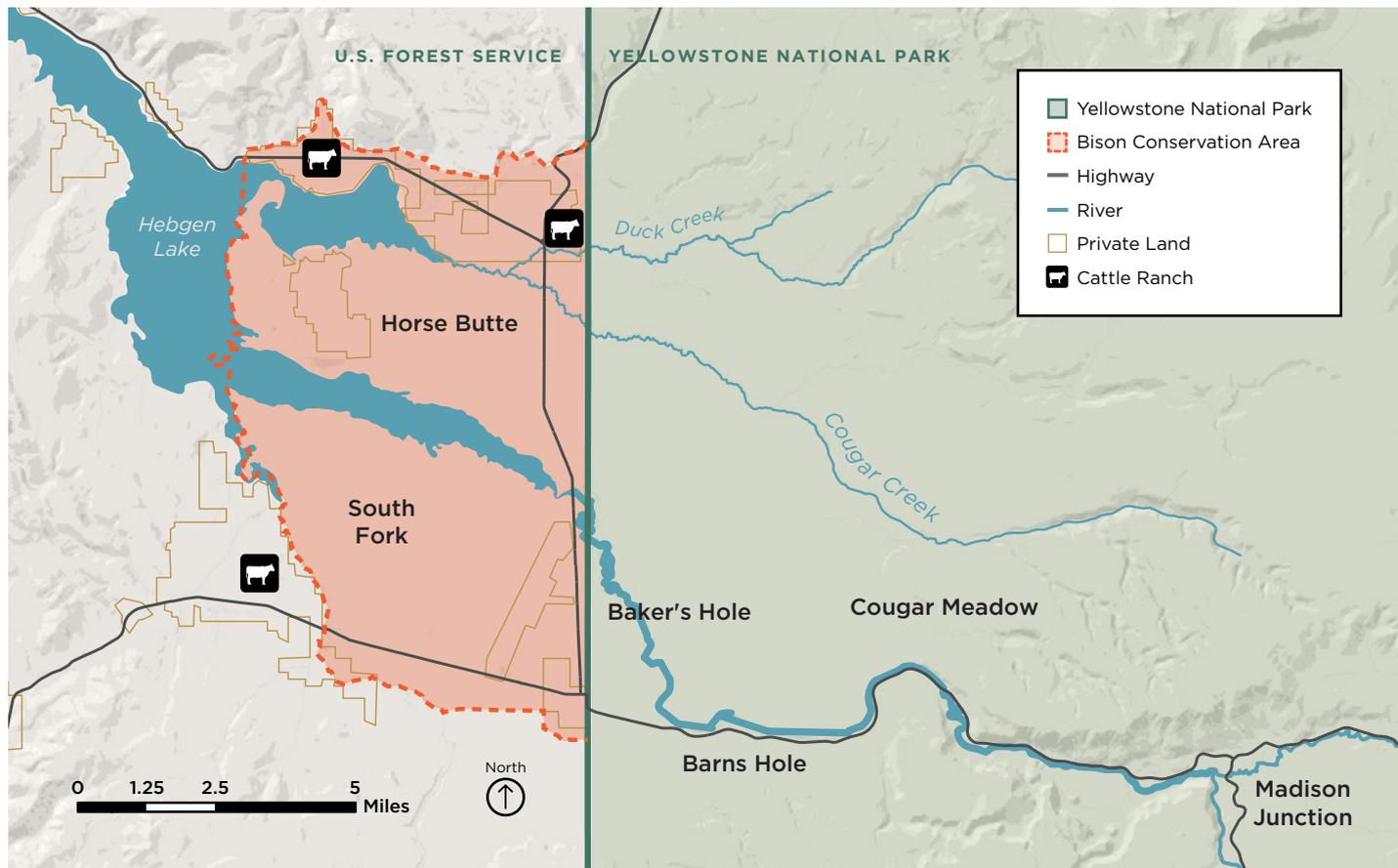
Bison Quarantine Tested

The 2000 IBMP EIS and record of decision allowed for the possibility of sending bison that test negative (i.e. seronegative) to a quarantine facility. The signature agencies agreed quarantine was a legitimate tool for removing bison from YNP, but more research was needed to explore whether quarantine procedures could be effectively applied to wild bison.

In 2004, APHIS and MFWP prepared an environmental review that evaluated phase one of an experimental quarantine (MFWP 2004). There were three objectives for pursuing experimental quarantine:

1. Develop quarantine procedures that would allow Yellowstone bison that went through quarantine to be accepted as brucellosis free and suitable for establishment or augment of other bison herds;
2. Explore the possibility of conserving Yellowstone bison genetics by establishing new herds that are also brucellosis free;

Western Management Area for the Interagency Bison Management Plan



3. Use a step-wise approach to examine the feasibility of quarantine of Yellowstone bison and whether that tool could be used to conserve bison on larger grassland landscape outside of the GYE.

Phase one was approved and implemented in 2005 with the gathering of seronegative bison in a double fenced pasture near Corwin Springs, MT. A subsequent environmental review considered phases two and three of a quarantine, which called for more breeding, testing, and culling as needed to establish whether the quarantine process could produce brucellosis free bison (MFWP 2005). Those phases were also approved and the Quarantine Feasibility Study was then fully implemented.

Ultimately, the quarantine study demonstrated that the approved USDA quarantine protocol could be applied to wild bison that originate from those

herds with brucellosis to produce brucellosis-free bison (Clarke et al, 2014). The next challenge was determining the final location for those bison that graduated from the quarantine process. Neither previous bison quarantine environmental reviews evaluated a specific location for the bison that could come out of quarantine as brucellosis-free. This decision was addressed in subsequent environmental reviews that led to those bison being transferred to Native American tribes in eastern Montana. The relocation decision became the focus of great debate in the court of public opinion, the legal system, and the Montana Legislature. However, court rulings have upheld the transfer of bison to the Fort Peck and Fort Belknap reservations in Montana. Those transfers have now occurred, and bison are managed as wildlife by the Assiniboine and Sioux tribes of the Fort Peck Reservation and the Assiniboine and Gros Ventre tribes of the Fort Belknap Reservation.

2004

Bison Hunting Reconsidered



Cowbirds on bison. © George Peters

In 1991, the Montana Legislature took action to eliminate bison hunting in Montana because of the public controversy surrounding the hunt. Despite that action the 2000 EIS considered several alternatives that included public hunting of bison. The final selected alternative did not include public hunting as a primary tool for managing bison.

The 2003 Montana Legislature reinstated statutory authority to conduct the public hunting of bison. MFWP responded to that legislative change the following year by completing an environmental review of public bison hunting, and the decision was made in 2005 to once again allow public hunting of bison that leave YNP. The hunt that began in 2005 was structured differently than earlier attempts. The number of hunters allowed on the landscape at any one time was very limited, and hunters were left to their own skills to hunt bison in an effort to make the hunt similar to other big game hunts. The restructured approach to hunting was successful in avoiding the controversy of previous hunts, and allowed for a modest hunter harvest of bison.

2005

Native American Tribes Asserted Their Right to Hunt Based On Historical Treaties

The Confederated Salish and Kootenai Tribes and the Nez Perce Tribe asserted their rights under historical treaties to hunt bison on public land outside of YNP in 2005, and those rights were formally recognized by the State of Montana. That formal recognition involved a review by the Montana Attorney General's Office as well as MFWP agency counsel. The tribes began hunting bison in 2005. Since 2005, two more tribes, the Shoshone Bannock of Idaho, and the Confederated Tribes of the Umatilla from the State of Washington, were recognized to have treaty-based hunting rights for bison, and they have exercised those rights. Each tribe establishes and enforces its own hunting regulations.

Completed "A Status Review of Adaptive Management Elements 2000-2005"

The IBMP partners conducted a 2005 performance review of their own efforts to implement the IBMP. They concluded that management efforts had allowed the responsible agencies to fulfill the fundamental goals of the IBMP to-date. However, they documented slow progress to advance to management Steps 2 and 3. They also introduced and endorsed the first adaptive change in the IBMP that allowed for public bison hunting to be used as a management tool when bison migrated into Montana.

2006

Adaptive Changes Altered Operating Procedures

The IBMP partners agreed to three adaptive changes in the form of signed adjustments to their operating procedures:

Strategic hazing: Under this agreement bison could be hazed away from high-risk areas to low-risk areas where cattle are not found or bison are not likely to otherwise come in contact with cattle. This was a shift from previous routine efforts to haze bison all the way into the park even at times with high snow pack. These previous efforts were an exercise in futility as bison would often come right back out of the park after hazing. This practice resulted in expensive hazing efforts, and increased the risk of wildlife-vehicle collisions as bison moved more frequently across Highway 287 north of West Yellowstone.

Tolerance of bull bison: This provision allowed for more tolerance of bull bison outside of the park. It was an attempt to allow for more hunting opportunity of bulls. It was based on the acknowledgement that there was generally less brucellosis risk associated with bull bison, although that was not explicitly stated in the adaptive change.

Bison Population: Identified a population of 3000 bison in YNP as a trigger for risk management actions rather than a goal to be achieved.

Bison in winter.
© George Peters/
ISTOCKPHOTO

2008

U.S Government Accountability Office (GAO) Completes Audit of IBMP Performance

The management of bison in YNP has been the focus of GAO reviews in 1992, 1997, 1999, and 2008. The GAO is an independent non-partisan agency that works for Congress to investigate how the government is spending taxpayer dollars. The 2008 GAO review concluded the management agencies needed to "...improve their accountability, transparency, and management of Yellowstone bison by developing measurable objectives and reporting yearly on progress, among other actions" (U.S. GAO 2008). These conclusions led to a dramatic change in how the IBMP managers approached their responsibilities to implement the IBMP. They developed a more well defined approach to adaptive management that included measurable objectives and monitoring, a comprehensive website to increase transparency, and an annual report to also increase transparency and accountability.



2008

IBMP Managers Produce Adaptive Management Changes Captured in a Format Responsive to GAO Audit Findings

In response to the 2008 GAO audit the IBMP managers released several adaptive changes that listed a goal, objective, management actions, monitoring metrics, and management response for each adaptive change. A similar format for subsequent adaptive changes has endured through the present implementation of the IBMP.

Some of the important 2008 adaptive changes were:

- Increased tolerance for mixed groups of bison during winter and spring in Zone 2;
- A commitment to apply the results of the research on brucellosis persistence in the environment;
- Tolerance for bachelor bull groups in Zone 2;
- A commitment to work with private livestock producers and private landowners to create conflict-free habitat for bison;
- Pursue a better understanding of bison population dynamics and genetics;
- Minimize use of shipping bison to slaughter as a management tool;
- Re-commitment to vaccination as a risk management tool for both bison and cattle;
- Re-commitment to spatial/temporal separation of bison and cattle (i.e. essentially continued use of hazing, trapping, and ship to slaughter) with a change of the haze back date on the north side from April 15th to May 1st.



Herd of bison in
Yellowstone National Park.
© imagebroker/Alamy

Royal Teton Ranch Grazing Rights Leased

In order to go to Step 2 as prescribed in the IBMP the grazing rights had to be purchased from the Royal Teton Ranch (RTR). The RTR is located a few miles north of the park boundary and they have routinely run domestic livestock on their property. The cattle on their property were essentially a bottleneck for any bison movement to the north out of YNP. After years of negotiation the grazing rights for the Royal Teton Ranch were purchased under a 30-year lease agreement. This lease was negotiated and purchased by MFWP on behalf of the IBMP partners and was funded in part by MFWP, YNP, and non-government organizations including National Wildlife Federation and National Parks Conservation Association.

Cache Eldridge Grazing Allotment Retired

The Cache Eldridge allotment was one of two the Gallatin National Forest (GNF) livestock allotments leased in the Taylor Fork drainage near the north boundary of YNP off of the Gallatin River drainage. The Taylor Fork grazing allotments were mentioned in the final record of decision as a rationale for limiting the presence of bison in that area.

2009

Tribal Representatives Added to the IBMP Managers' Committee

The Salish-Kootenai and Nez Perce Tribes along with the Inter-Tribal Bison Cooperative requested representation on the Managers' Committee for the IBMP. The five existing agencies represented on the Manager's Committee agreed and those entities were welcomed to the table as voting members at the IBMP's November meeting. This critical change brought an important perspective and voice to the bison management discussions.



2010

Official Order Creates Designated Surveillance Area for Brucellosis

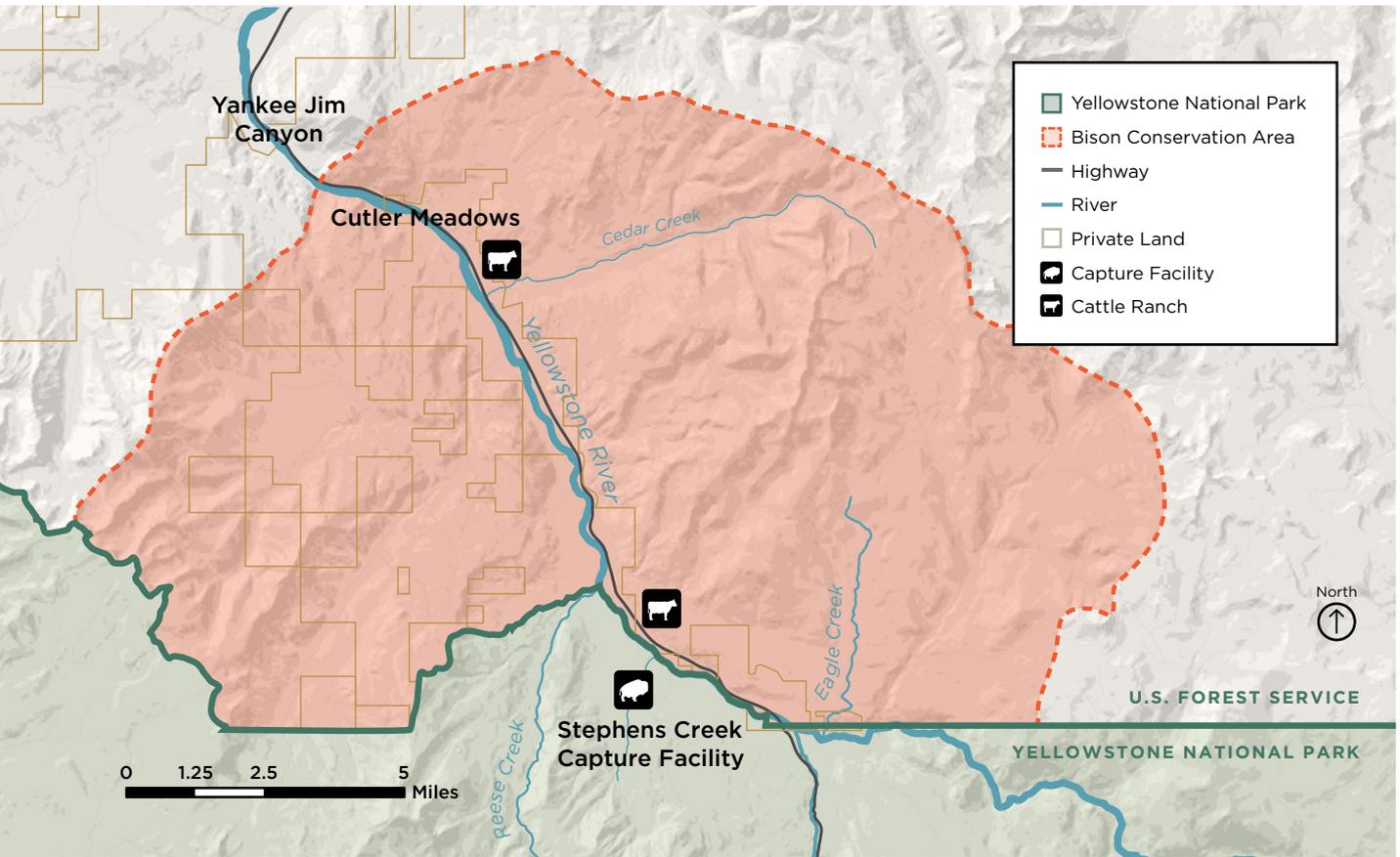
The Montana Board of Livestock approved an official order that created a designated surveillance area (DSA) for brucellosis. The order addressed livestock testing requirements, animal identification, and vaccination requirements within the boundary of a defined geographic area (i.e. the DSA). This important change limited the financial and logistical impacts of brucellosis on livestock producers to a portion of a four-county area (i.e. those counties with known reservoirs of brucellosis in elk and bison—portions of Park, Madison, Gallatin and Beaverhead counties). Prior to this order, the entire state's livestock industry could be affected by the state's loss of brucellosis-free status caused by multiple livestock infections with brucellosis.

Wapiti Grazing Allotment Retired

The Wapiti Grazing allotment was the only remaining allotment on the GNF in the Taylor Fork Drainage and the upper Gallatin in general. So with this grazing allotment retired there were no more cattle grazing on public land in the entire upper Gallatin area.

Bison walking through deep snow near Tower Junction.
© Jim Peaco

Northern Management Area for the Interagency Bison Management Plan



2011

Slip and Slide Grazing Allotment Retired

The Slip and Slide Grazing allotment is in an area north of Gardiner and south of Yankee Jim Canyon on the eastern side of Highway 89 in Montana. It is in an area of the GNF that could be frequented by bison if allowed. There were two separate sections of this allotment leased by two different livestock producers. This retirement only affected one of the two leases. The other section of the allotment remains active.

Citizen's Working Group Presents Recommendations to IBMP Managers

Since the adoption of the IBMP, the managers struggled to effectively involve the public in deliberations regarding implementation. After much discussion in 2010, the managers endorsed the idea of a self-formed citizen's group and offered to provide funding



for its facilitation. The Citizen's Working Group was formed and following a year's work, presented its recommendations to the IBMP managers in 2011. The managers chose to adopt some but not all of the recommendations. Their recommendations focused on brucellosis risk reduction, bison population management, and bison habitat.

Adaptive Changes to Allow for Greater Tolerance of Bison

The IBMP managers agreed to allow for greater tolerance of bison on approximately 70,000 acres in the Gardiner Basin. The original language in the IBMP only allowed for very few bison north of YNP after the RTR grazing rights were leased. This adaptive change allowed for bison to migrate north of the park boundary but they would be limited on the northern extent of the Gardiner Basin by the Yankee Jim Canyon. This important adaptive change allowed the managers greater flexibility in managing bison in years where a large out-migration from YNP occurred. Bison outside of the park under this adaptive change would still be hazed back in the park by May 1 as agreed to in the 2008 adaptive changes.

2012

Adaptive Changes with Detail on Bison Use North of the Park Line

The 2012 adaptive changes simply provided more detail with monitoring metrics regarding the 2011 adaptive changes that allowed for tolerance of bison north of the park line in the Gardiner Basin.

2013

Adaptive Changes to Address Hazing Bison Away from Zone 3 Boundary

Bison found their way across the Zone 3 boundary north of Gardiner on the east side of Highway 89 when the IBMP managers began to implement the 2011 Adaptive Change that allowed for bison tolerance in the Gardiner Basin. To address this concern the Managers agreed to a further adaptive change that allowed for strategic hazing of bison as they approached the Zone 3 boundary to avoid further breaches.

2014

Adaptive Change to Consistently Document All Previous Adaptive Changes

In 2014 the IBMP Managers chose to format all previous adaptive changes in a consistent manner. The Managers did not agree to any additional adaptive changes in 2014.

Catalysts for Change in Bison Management

Adaptive changes in the current IBMP occurred as a result of advancements in science, changes in the legal framework, changes in the social setting, changes on the landscape, and management experience gained by implementing the IBMP. Those changes are further reviewed and considered here as we embark on developing a new Yellowstone-area bison conservation plan and consider fundamental changes in bison management.



Advancements in Science

When the IBMP was established, agencies recognized that future research findings could be cause to reconsider elements of the IBMP, and make appropriate management changes based on those findings. Here we focus on a limited number of research efforts that should be further considered in the development of a new Yellowstone-area bison conservation plan.

Brucellosis Persistence/ Disappearance Study

The current IBMP called for a study of the persistence/disappearance of brucellosis when shed in birthing materials in natural settings. Agency managers wanted to know how long the brucellosis bacteria would persist in the environment when shed by bison in birthing material. That information could better inform them on how to provide for adequate temporal separation of bison and cattle that could occupy the same landscape, and thereby reduce the risk of brucellosis infection to cattle. For example, the IBMP managers wanted to know whether it was appropriate to haze all bison back into YNP by May 15th in order to reduce risk of brucellosis infection to cattle (i.e. as called for by current IBMP).

Aune et.al. (2012) key findings regarding persistence/disappearance of brucellosis were:

- "...the brucella bacteria can persist on fetal tissues, soil and vegetation from 21 days to 81 days depending on month, temperature and exposure to sunlight." So the bacteria persist longer (i.e. 81 days) in colder temperatures with less exposure to sunlight that occurs for contamination events started in February, and that the length of time the bacteria persists gradually declines (i.e. 21 days), as days get longer and warmer into May.
- No brucella bacteria persisted beyond June 10th.
- Fetuses were more quickly scavenged within YNP than outside the park boundary, and by a variety of both birds and mammals. They attributed the difference to higher numbers of scavengers within YNP.

MANAGEMENT IMPLICATIONS

The IBMP managers did not feel the need to significantly alter the haze back dates in the current IBMP in response to the completed research on persistence/disappearance. No change was made in the date when bison must be hazed back in YNP on the west side (i.e. remained May 15th). The haze back date on the north side of YNP was extended from April 15th to May 1st.

There is an opportunity to better apply the research results and fine tune efforts to manage for situational separation in high risk locations (i.e. where cattle currently occupy or where they will be for spring/summer pasture) and during high risk periods rather than the broad stroke management techniques applied in the current IBMP (e.g. all bison must return to the park by May 15th on the west side of YNP).

Quarantine Study

As described in the previous section, the current IBMP also called for a study of whether a quarantine protocol could be developed that produced brucellosis free bison. That study successfully demonstrated that operational quarantine could be used to identify brucellosis free bison from the Yellowstone herd. In 2014 all of the bison that successfully emerged from quarantine were transferred to tribal lands in eastern Montana.

MANAGEMENT IMPLICATIONS

YNP is reviewing the establishment of an operational quarantine program through a National Environmental Policy Act (NEPA) review process. If the Park Service is successful in creating that program, then quarantine could:

- Become one tool for managing the size of the bison population in and around YNP;
- Reduce the reliance on ship to slaughter to cull the bison population when it exceeds the acceptable population target;

- Provide a source of bison with unique genetics to supplement or develop conservation herds of bison in other locations in North America.

Bison Bull Semen Study

The IBMP managers have generally considered bull bison to provide less risk of brucellosis transmission to cattle than cow bison. This was evidenced by the 2006 and 2008 IBMP adaptive changes that allowed for more tolerance for bull bison as described previously. These management actions were supported by Frey et.al. (2013) in their research that tested whether bull bison could shed an infectious dose of brucella in their semen. They concluded that although bull bison can shed brucella in their semen it is at concentration levels that are not an infectious dose.

MANAGEMENT IMPLICATIONS

It is clear now that bull bison pose almost no risk of brucellosis infection for cattle. That reality should allow managers more flexibility in managing bull bison, and eliminate any disease related requirement for spatial and temporal separation between bull bison and cattle.

Brucellosis Science Review

In 2013, the Park Service and MFWP sponsored a workshop to review the science of brucellosis and to integrate that science into disease-management strategies for bison (NPS and MFWP 2013). They assembled a panel of eight experts from across

the country with expertise in wildlife disease management. There were representatives from academia, the private sector, and government agencies.

Some of the expert panel's key findings were:

- Remote vaccination of bison would not be cost effective in reducing the risk of spread of brucellosis;
- Encourage more incentive based approaches to managing brucellosis in bison that could be explored through work with stakeholder groups. For example, these approaches could include financial incentives for cattle producers who take steps to reduce the risk of brucellosis infection through animal husbandry techniques, etc.

MANAGEMENT IMPLICATIONS

The expert panel's findings discouraged use of remote vaccination of bison as a tool to effectively (both costs and operationally) reduce the risk of spread of brucellosis from bison. They pointed out how ineffective current vaccines are in bison, and the tremendous expense of a fully implemented vaccine program. Remote vaccination of wild bison was a key feature of the current IBMP and it now appears to be an ineffective management alternative for reducing risk.

The panelists described the potential value of stakeholder involvement in the development and implementation of a bison management strategy. Their recommendation suggests a different approach to how the agencies approach public involvement in the development of the revised IBMP.



Bison in Yellowstone National Park.
© Lorcel G/Dreamstime.com

Changes in the Legal Framework

Bison management in YNP and on adjacent lands in Montana is guided by federal laws and regulations as well as Montana laws and rules. Important changes have occurred with both since the IBMP was originally adopted. These changes provide significant opportunity to improve how we manage Yellowstone bison in the new bison conservation plan.

Legal Authority for Bison Hunting Reinstated and Tribal Treaty Hunting Recognized

As mentioned previously, the Montana Legislature reinstated the authority for MFWP to offer a public hunting opportunity for bison in 2003. This authority had been revoked in 1991 by the Montana State Legislature as a result of controversy surrounding bison hunting in the late 1980s.

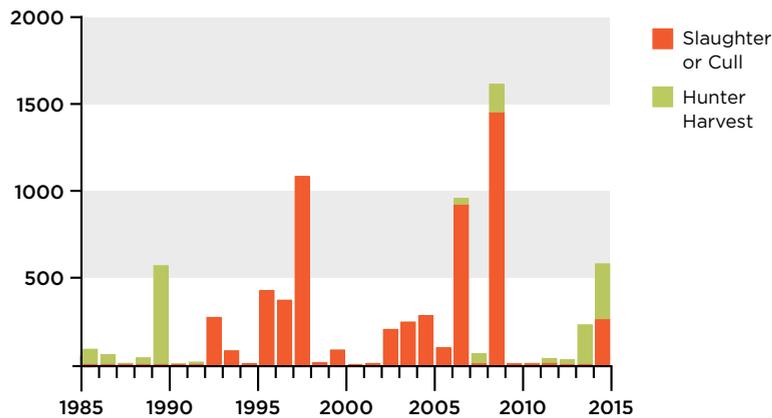
Some tribal governments began to assert their right to hunt bison under existing treaties shortly after the State of Montana reinstated its hunt. Both the state-licensed hunters and tribal treaty hunters participated starting in 2005.

MANAGEMENT IMPLICATIONS

Although bison hunting was considered in the 2000 IBMP EIS and record of decision, hunting was not a key feature of the final IBMP. Hunting began slowly as both Montana and tribes explored methods to establish fair-chase and culturally acceptable hunts. State-licensed and tribal treaty hunters harvested only 46 bison in 2005, and by 2014 that harvest

Figure 2.

Yellowstone-area Bison Removed from 1985–2014



number grew to 328. (Figure 2). IBMP managers now manage the size of the bison population through shipping bison to slaughter and through hunting. Bison hunting has also become very popular among Montana hunters with over 10,000 hunters applying for only 44 bison licenses available in 2013.

IBMP managers have expressed an interest in using hunting as the preferred tool for managing the size and distribution of the bison population, as opposed to trapping bison and shipping them to slaughter. Despite that interest, the reality is the IBMP 2014/2015 operations plan indicated that approximately 600 bison would be removed through trapping and 300 through hunting. Based on how bison are managed under the current IBMP, with limited tolerance on habitat outside of the park, it appears that a peak harvest through hunting is currently about 300 bison. With expanded habitat and larger hunting zones, the harvest could be increased in a way that would not increase hunter congestion or human-wildlife conflicts, while ensuring a quality fair-chase public hunting opportunity in-line

with other hunting opportunities beyond Yellowstone's borders on federal lands in Montana.

Bison movement patterns in and out of YNP determine when and in what numbers they become available to hunters. Those movement patterns are dependent on the total population size and how it is distributed in YNP, along with the severity of the winter. In more severe winters, bison find less forage in YNP and have more need to migrate out of the park in search of available forage.

The tribes and state continue to struggle with the logistics of hunting on the confined landscape where bison are currently permitted in Montana. The hunter harvest continues to concentrate on the border of YNP, which has created some conflict with nearby landowners and at times limited movement of bison to suitable public land habitat outside of YNP.

The current IBMP lists a bison population target of 3,000 in order to limit the number of bison that would exit YNP during severe winter conditions. It is reasonable to assume that an annual growth of that size population is about

300-450 animals, given normal predation and natural mortality. If hunters were able to continue to harvest around 300 animals annually then the size of the bison population could be largely managed through hunter harvest. Experience has demonstrated that at a population of 3,000 bison, fewer animals migrate out of YNP, except in more severe winters. So in mild to average winters, fewer bison become available to hunters in Montana and it is difficult or impossible to achieve an annual hunter harvest of 300 bison. As a result, the bison population tends to creep higher after a series of mild winters and this leads to a greater reliance by the IBMP managers on trapping and shipping bison to slaughter in order to manage towards a population target of 3,000 bison. For example, in 2014 the summer estimate of the YNP population was 4,868 bison following several years of limited removals. The annual growth in that size population cannot be managed through hunting alone and IBMP managers may need to remove a larger amount of bison through trapping and shipping bison to slaughter assuming the population goal remains at 3,000 (which studies have shown is below the carrying capacity of YNP by itself).

The solution to this dilemma could be found by increasing available habitat for bison outside YNP. This could allow for both a larger population target that Montana and YNP can agree on (i.e. larger than current IBMP target of 3,000) and potentially a larger hunter harvest in the future. Under this scenario, when a severe winter arrives and large numbers of bison migrate out of YNP,

Photographing bison
in Yellowstone National Park.
© Wollertz/Dreamstime.com



they would be distributed on a larger landscape where increased harvest could occur with less social conflict. This solution would require increased cooperation by the State of Montana and tribes to manage hunters to avoid the harvest conflict at the park borders and avoid driving bison immediately back into YNP because of intense hunting pressure. Ultimately, this management approach would provide a better decision space for managers and affords more time to apply an appropriate and acceptable management response.

Creation of the Designated Surveillance Area

The creation of the DSA in 2010 was an important step to appropriately limit the economic impacts of a brucellosis infection on the cattle industry to a more localized area. Previously, multiple brucellosis infections in cattle in an isolated area could cause a change in brucellosis disease status for the entire State of Montana. For example, multiple brucellosis infections in southwestern Montana could have an economic impact on cattle ranchers hundreds of miles away in north-central Montana, even though there is no risk of brucellosis infection for the cattle ranchers in north-central Montana. With the adoption of the DSA, the statewide brucellosis disease status no longer changes as a result of

identified infections. This in turn eliminates the statewide impacts on Montana's livestock industry that were associated with previous isolated brucellosis infections. The DSA instead focuses brucellosis risk management efforts only on the southwestern region of Montana where brucellosis is sometimes carried in wildlife (i.e. a portion of bison and elk).

The DSA was mapped as a zone that reflected the current understanding of the approximate area where wildlife (i.e. elk and bison) have shown evidence of brucellosis exposure. The DSA consists of portions of Park, Gallatin, Madison and Beaverhead counties. In the DSA, livestock producers are required to vaccinate all female cattle and domestic bison; brucellosis-test all cattle and domestic bison changing ownership or moving out of the DSA; and all sexually intact cattle and domestic bison leaving the DSA must be officially identified. The MDOL estimated that collectively all livestock producers within the DSA would incur an additional annual cost of about \$37,000, while the livestock industry statewide would experience an annual benefit of \$5,000,000 – \$11,000,000 by avoiding changes to the state's brucellosis free status (MDOL 2011).

MANAGEMENT IMPLICATIONS

At the time the 2000 IBMP was adopted, significant economic impacts on the livestock industry in Montana could have resulted from brucellosis infections in cattle. In 2011, this potential loss was estimated at \$5,000,000 – \$11,000,000 annually. Since the adoption of the DSA, this potential loss has actually been reduced to \$37,000 annually, affecting only livestock owners in the DSA. Under the requirements of the DSA, livestock owners and their veterinarians are reimbursed through the MDOL for testing at \$9.50-\$14 per head, and vaccination costs are reimbursed at \$8.50 per head (MDOL 2011; updated based on most recent reimbursement forms).

The adoption of the DSA has dramatically reduced the economic risk associated with a brucellosis infection. That reduction should in turn substantially alter how we evaluate alternative management approaches for bison. We should consider options that are not as risk-averse in the interest of reducing costs of current management efforts and improving our ability to better manage bison as wildlife.

Changes in the Social Setting

There is a large amount of public interest in bison management in Montana. Newspapers across the state regularly report on bison management activities in the Yellowstone area. YNP has advocates across the country and internationally that closely follow how YNP is managed, and particularly how the Yellowstone bison are managed. Public opinion on bison management continues to shift as our natural world and societal values change. Two separate polls conducted in the last few years (NWF 2012, DoW 2015) demonstrated strong public support for managing bison as wildlife in Montana. In fact, in the most recent poll over 70% of a random sample of Montanans said bison should be managed like other wildlife in Montana. These shifts should influence our lawmakers and the agencies responsible for managing bison.

Controversy Surrounding Trapping and Slaughtering Bison

Prior to the adoption of the IBMP in 2000 there were significant numbers of bison removed through slaughter or culling (Figure 2 – derived from White et. al. 2015). This trend continued ever after the adoption of the IBMP. Those actions, more than any other aspects of bison management, continue to trigger sharp criticism from the public. In 2008, the IBMP managers acknowledged this public distaste and made an adaptive change to the IBMP that demonstrates that trapping and shipping bison to slaughter should be used as a last resort.

MANAGEMENT IMPLICATIONS

The development of a new Yellowstone-area bison conservation plan is an opportunity to re-think management in a way that trapping and shipping bison is not only a last resort, but rarely if ever used. The IBMP managers could find greater public support for their efforts to manage bison, and at less cost than current efforts that involve trapping and shipping bison to slaughter.

Bison Hunting More Accepted as Management Tool

As described previously, bison hunting resumed in 2005. MFWP and tribes took a very measured approach to bison hunting. As a result, the hunt has generated less controversy than previous bison hunting outside of YNP, and hunting has also become an important tool for regulating the size of the bison population (Figure 2).

MANAGEMENT IMPLICATIONS

The traditional approach for managing wild game numbers in North America has been through public hunting. Widely known as the North American Model of Wildlife Conservation, this model has led to sportsmen and -women investing in conservation and management of wildlife, while effectively managing wildlife populations for the enjoyment of all. By providing more bison habitat outside of YNP on public lands where hunting is allowed this highly successful model could be applied more broadly to effectively manage the size of the bison population, shape animal distribution, and gain even more public support for bison-management efforts.



Bison jam on the road
between Mammoth and
Norris. © Neal Herbert

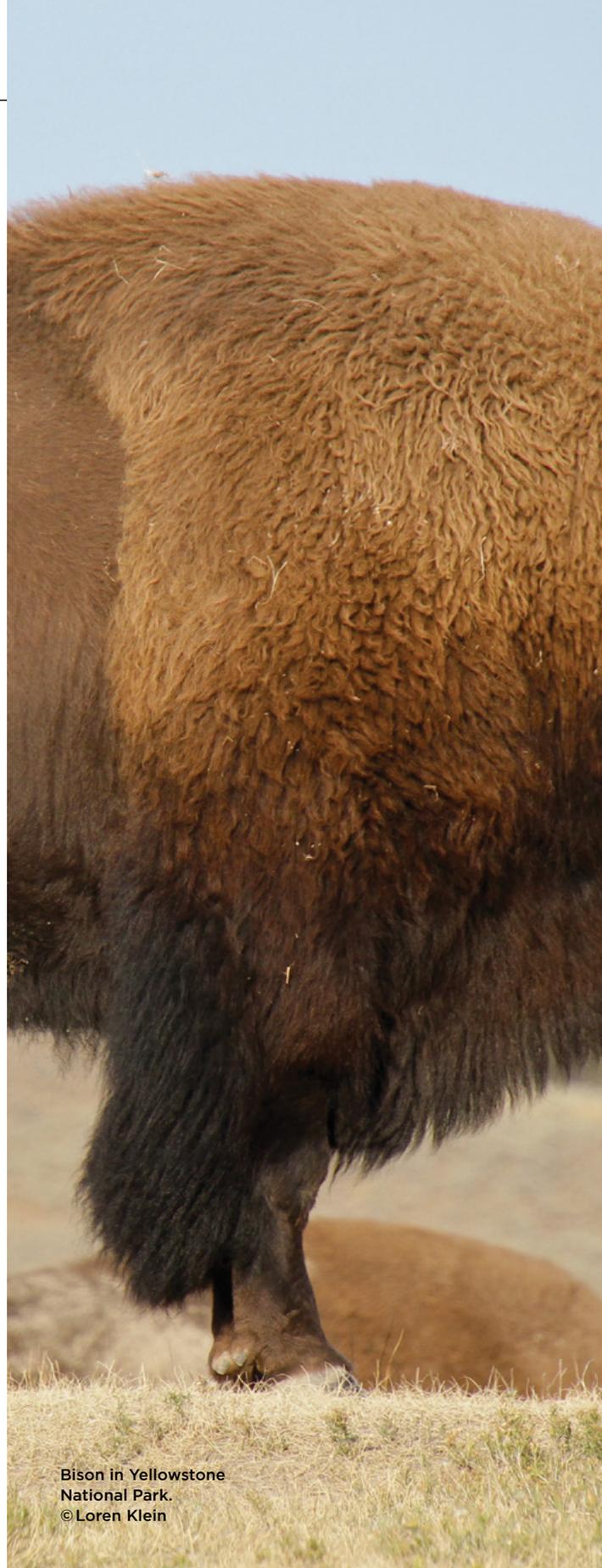
Grazing Allotment Retirements

Since the adoption of the 2000 IBMP four cattle allotments on federal lands have been retired in areas near YNP that are considered suitable habitat for bison. In addition, the grazing rights were leased for 30 years from the Royal Teton Ranch (i.e. located just north of the YNP boundary), which in effect removed cattle from the ranch for that period. The removal of cattle has eliminated the risk of transmission of brucellosis from bison to cattle in those areas.

MANAGEMENT IMPLICATIONS

The retirement of key grazing allotments that has occurred over the past 15 years has substantially reduced the risk of brucellosis transmission from bison to cattle on lands adjacent to YNP. This creates more opportunity for bison to freely move in Montana without disease-related conflict. The retirements have allowed bison to roam longer on about 70,000 acres north of YNP's boundary, and have allowed for current consideration of an adaptive change that would allow bison to occupy about 421,000 acres of habitat outside of YNP year-round (MFWP 2012, MFWP 2013).

The new Yellowstone-area bison conservation plan should recognize the value of voluntary grazing retirements as a tool to increase public hunting opportunity and reduce the risk of brucellosis transmission from bison to cattle. Future grazing retirements could create more conflict free management options for bison on a broader landscape in Montana.



Bison in Yellowstone
National Park.
© Loren Klein



Improved Understanding of the Risk of Brucellosis Transmission from Elk to Cattle

In 2007, a brucellosis infection was identified in a cattle herd in Montana. After an investigation, the Montana State Veterinarian concluded that infection most likely was caused by an exposure of the infected cattle to brucellosis-infected elk. Since that time, several additional infections in cattle have been linked to exposure to brucellosis-infected elk. In response to these infections, MFWP developed management guidelines for mitigating risk of brucellosis transmission from elk to cattle.

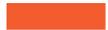
For many years, brucellosis seroprevalence rates in Montana's elk population were quite low and were found only in areas very near YNP. Seroprevalence rates have slowly increased in some Montana elk herds and spread to a larger area. The reported spread in seroprevalence has led to an expansion of the DSA. Recent seroprevalence rates in elk were reported at just over 50% in elk found in Hunting District 317 located in the Paradise Valley north of YNP (MFWP 2015). That rate is similar to the rate historically occurring in the Yellowstone bison herd.

MANAGEMENT IMPLICATIONS

Bison have been managed aggressively in Montana ostensibly because of the threat of brucellosis infection for Montana cattle. Management agencies justified the aggressive management by citing the 50% brucellosis seropositive rates in bison. Conversely, brucellosis risk in Montana elk has been managed less aggressively (i.e. through situational use of spatial and temporal separation of elk and cattle) despite seroprevalence rates in at least one location that are similar to bison. We should adopt a similar approach for bison management that embraces situational use of spatial and temporal separation of bison and cattle.

Policy Recommendations

It is time for a new approach to managing bison in YNP and on adjacent lands in Montana. Policy changes are warranted on-the-ground based on agency experience and changes in the legal framework, social setting, and on the landscape. Our recommendations for the development of the new Yellowstone-area bison conservation plan are highlighted here:



Development of the New Yellowstone–Area Bison Conservation Plan

- The agencies should evaluate different models for stakeholder involvement to better incorporate stakeholder interests into plan development (e.g. the Wildlife Conservation Society’s AHEAD program offers examples that should be considered).
- The selected model should require, among other things, the creation of a stakeholder group representing a broad set of interests. For example the group should include: sportsmen, livestock producers, wildlife advocates, and local businesses.
- The model should ensure that the recommendations of a stakeholder group are reflected in one or more management alternatives, and the stakeholder group should be asked to collaborate with the agencies in the creation of the final preferred alternative.
- The goal would be to develop a process for stakeholder involvement that will be meaningful and effective in developing alternatives that are supported by independent scientists, and supported by stakeholder interests.
- The agencies should create an independent science panel to provide review and recommendations on the science applied in development of the plan. This could be satisfied by re-directing the proposed National Academy of Science review to serve this function.
- The analysis of new bison conservation alternatives should include an explicit assessment of risk. Each alternative should assess the probability and magnitude of environmental and economic impacts. Among other things, the analysis should address the likelihood or statistical probability of brucellosis infection from bison to cattle under each of the alternatives along with the costs of each alternative. Those probabilities should be used to assess the overall economic efficiency of each alternative. The risk analysis should also offer a subjective assessment of risk that describes perceived risk based on psychological, social, institutional, and cultural considerations.

General Provisions for the New Yellowstone–Area Bison Conservation Plan

- The goals of the new plan should be:
 - Manage for a wild population of bison in YNP and on adjacent lands in Montana.
 - Manage Yellowstone-area bison to limit the risk of the spread of brucellosis from wild bison to cattle.
 - Manage for bison outside of YNP under the principles of the North American Model of Wildlife Conservation.
 - Provide for adequate conservation measures to prevent the listing of bison under the Endangered Species Act.
- A wild population of bison should be defined as: One that roams within a conservation area that is large enough to sustain ecological processes such as migration and dispersal, sufficiently abundant to mitigate the loss of existing genetic variation, subject to forces of natural selection such as competition for breeding opportunities and food, predation, and substantial environmental variability, and not owned but managed for the public good (adapted from White and Wallen 2012).
- The new plan should focus on managing the risk of brucellosis infection rather than targeting brucellosis eradication. Eradication of brucellosis in wildlife is not a realistic goal given currently available disease-management tools.
- The new plan should remain an adaptive management plan that is adjusted over time given changes in relevant science, land management, the ecological environment, and the socio-political landscape. This should be completed with an annual review and adoption of appropriate adaptive changes using the format that was the product of the 2008 GAO review, and reflected in the 2014 adaptive management plan.

Management Units

- We expect there will continue to be a need to establish bison-management units where different types of management techniques are appropriate or required.
- The management objectives and techniques should be tailored to different locations based on environmental conditions, biological needs, and social tolerance.
- Inside YNP, bison will continue to be managed largely through natural regulation.
- When bison seasonally migrate beyond park borders north and west of the park they confront differences in available habitat, carrying capacity, and social tolerance differs. Therefore, different management techniques may be appropriate and should be based on the ecological needs of bison, social tolerance, and available habitat.
- When a herd or herds of bison remain outside of YNP on a year-round basis, different management techniques may be appropriate, and once again should be based on the ecological needs of bison, social tolerance, carrying capacity of available habitat, and take into account migratory bison.
- The management unit definition must reflect the new goals of the Yellowstone-area bison conservation plan as outlined here, and more specifically ensure that bison are welcome on year-round habitat in Montana.

Management Tools

- The risk of brucellosis infection should be primarily addressed through situational use of spatial and temporal separation of bison and domestic cattle. During high-risk periods, the plan should prevent co-mingling of bison and cattle. This should be achieved through appropriate fencing; by hazing bison away from pastures holding livestock; and lethal removal as a method of last resort in those circumstances when other management tools are unsuccessful in maintaining separation.
- The abundance and distribution of bison should be managed as much as possible through state-licensed hunting and tribal treaty rights hunting outside of YNP. Bison hunting should end by March 31 each year given the approach of calving season.
- Pursue a quarantine program that would create the opportunity for YNP bison to be transferred to tribal lands, federal lands, and other potential habitat that meets predefined standards. Operational quarantine could also be used as an additional tool suitable for managing bison numbers.
- In extreme circumstances when bison numbers have far exceeded acceptable population ranges, it may be appropriate to use the Stephens Creek capture facility. However all other management tools and approaches should be attempted before consideration of use of the capture facility as a method of last resort.
- Livestock vaccination should continue as prescribed under the current rules for the DSA. Vaccinating bison is not a cost-effective tool for managing risk of brucel-

losis infection and should not be pursued. Plan partners should champion efforts to develop a more effective livestock vaccine for brucellosis.

- Develop a publicly funded compensation program for land-owners who incur bison-caused damage to personal property or economic loss due to brucellosis infection in cattle. The program should focus on damage that is demonstrated to be above and beyond federal indemnification for direct loss of brucellosis-infected herds. This could be incorporated in the responsibilities of the existing Montana Livestock Loss Board (MLLB), or through a separate entity that is patterned after the MLLB.

Bison Population

- The bison population addressed by the new plan should be managed to preserve the ecological integrity of the population as a whole and maintain or improve genetic diversity, while not increasing the risk of brucellosis transmission.
- Develop population objectives for different habitat locations that reflect the unique human needs and ecological characteristics associated with the current or potential bison habitat in that location.
- Use the Northern Yellowstone Cooperative Wildlife Working Group (i.e. the multi-agency collaborative that currently exists) to annually review bison harvest levels, habitat management needs, and inventory needs as we do with other cross-boundary wildlife species shared by the State of Montana and YNP.

Research and Education

- **Research and Monitoring:** The new plan should include an assessment of research and monitoring priorities for the next 10 years and identify key management questions that must be addressed to advance the adaptive framework articulated by the plan. Key research questions to address critical uncertainties, clear monitoring strategies to improve management, and important management decision triggers must be updated in the new plan to ensure the continued evolution of best management practices to achieve the new plan goals. A significant element of research and monitoring should focus on measuring social and human dimensions to better understand attitudes and beliefs of affected stakeholders and monitor changes in these social attributes as adaptive management is applied.
- **Education and public outreach:** A major part of any future success in bison management depends on translating science to the public, presenting the best science practices, and explaining management strategies to the public and specific stakeholders. The new plan should include a communications strategy that articulates clear targets, strategies, and channels for communicating about the new plan and changes in implementation.

Conclusion

We have an important opportunity to re-shape the management of bison in YNP and adjacent lands in Montana as the state and federal agencies develop a new Yellowstone-area bison conservation plan. The policy recommendations offered here are intended to direct the development of a new plan to replace the IBMP in order to firmly establish bison as valued wildlife, and to ensure their conservation for generations to come, while also addressing social considerations.

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